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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/459,641	12/13/1999	YOSHIHIRO IZUMI	1035-240	1435

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EXAMINER	
VOCKRODT, JEFF B	
ART UNIT	**PAPER NUMBER**
2822	

DATE MAILED: 10/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/459,641	IZUMI ET AL.	
	Examiner	Art Unit	
	Jeff Vockrodt	2822	

-- The MAILING DATE of this communication appears on the cover sheet with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 December 1999* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-64* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,4,7-9,11,13-18,20,21,24-26,36,38-45,47,48,50,52,55,57-59 and 62* is/are rejected.

7)☒ Claim(s) *2,5,6,10,12,19,22,23,27-35,37,46,49,51,53,54,56,60,61,63 and 64* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This office action is in response to the new application filed on December 13, 1999.

Claims 1-64 are pending.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 3-4, 7-9, 13-15, 18, 20-21, 24-26, 36, 38-43, 45, 47-48, 52, 55, 57-58, 59, and 62 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Pat. No. 6,342,700 ("Izumi '700") in view of U.S. Pat. No. 5,523,628 ("Williams").

Claim 1 differs from claim 1 of Izumi '700 by reciting "space keeping members for keeping a space between the substrates."

Williams teaches placing an array of discrete stops (58) adjacent conductive bumps (64) that join a pixel readout substrate (28) and a detector chip (20). The stops provide protection and mechanical support.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the invention of claim 1 of Izumi '700 to include an array of discrete stops among the conductive contacts to provide protection and mechanical support as taught by Williams.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 1, 3-4, 7-9, 13-15, 18, 20-21, 24-26, 36, 38-43, 45, 47-48, 52, 55, 57-58, 59, and 62 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 5,420,452 ("Tran") in view of Williams.

Tran teaches (Example 3, col. 9) a solid state radiation detector including: a pixel substrate having an array of polysilicon TFTs (40), an alignment layer (unlabelled conformal coating overlying the TFT and substrate in Fig. 3a), a detector substrate (38), and a metal contact (66) connecting the detector substrate with the readout circuitry via TFTs (40).

The pixel alignment layer is met by Tran. In this regard, it is noted that applicant's use of "alignment layer" seems to be an anachronism. In liquid crystal display (LCD) technology, the insulating layer formed between the TFT and the liquid crystal (LC) material was usually referred to as an alignment layer. An example of this is U.S. Pat. No. 5,398,127 ("Kubota"). However, in the present invention there appears to be nothing that is aligned by the "alignment layer." Applicants use the term "alignment layer" only in the sense that a person of ordinary skill in the art would associate the layer with an alignment layer in a LCD/TFT type device. Kubota is cited to show that the a person of ordinary skill would associate the unlabelled conformal coating in Tran (discussed above) with a pixel alignment layer.

Claim 1 differs from Tran by requiring "space keeping members for keeping a space between the substrates." Tran merely teaches conductive contacts (66) between the detector and readout substrates.

Williams teaches placing an array of discrete stops (58) adjacent conductive bumps (64) that join a pixel readout substrate (28) and a detector chip (20). The stops provide protection and mechanical support.

Tran and Williams are analogous art as they are both within the solid state radiation detector field.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to include an array of stops adjacent the contacts (66) in the radiation detector of Tran to provide protection and mechanical support as taught by Williams.

Claim 1 corresponds to the subject matter of Tran in view of Williams as follows: A two-dimensional image detecting device, which has a pixel substrate being provided with a pixel alignment layer including a plurality of pixels (Tran, see 32, Fig. 2), and an opposing substrate (Tran, Shottky barrier diode array layer 30) being provided with a photoconductive layer for generating electrical charge in response to incident light, comprising:

conductive connecting members (Tran, 66, Fig. 3A) which are disposed so as to correspond to the pixels on said pixel alignment layer (Tran, not labeled and layer 56, Fig. 3A) and which electrically connect said pixel alignment layer and said photoconductive layer (40), and

space keeping members (Williams, 58, Fig. 10) for keeping a space between the substrates.

Claim 3. The stops are insulators (Williams, col. 4, ll. 23-26).

Claim 4. Williams teaches soft indium bumps and stops to protect those bumps implying that the stops are harder than the soft bumps.

Claim 7. Williams teaches a 6 micron indium bumps (col. 4, ll. 53-61).

Claim 8. Williams teaches indium, which is soft.

Claim 9. The thermoplastic stops 20 protect the soft indium bumps 24 in Williams.

Claim 13. The stop is made of a thermoplastic adhesive in Williams.

Claim 14. The detector can be CdTe (Tran, col. 6, 2d paragraph).

Claim 15. The photoconductive material is silicon, which exhibits photoconductivity to visible radiation.

Claim 18. The subject matter of Tran in view of Williams meets the limitations of claim 18 in a similar manner as it does claim 1. The electrode wires arranged in lattice form are present in the schematic depiction of the substrate in Fig. 2 of Tran.

Claim 20. See treatment of claim 3.

Claim 21. See treatment of claim 9.

Claim 24. The method of bonding substrates to form the radiation detector is set forth in Example 3, col. 9.

Claim 25. The stops are for keeping space in Williams.

Claim 26. Williams teaches forming stops 36, 42 on both substrates (Fig. 8).

Claims 36, 38. Williams teaches screen printing the thermoplastic onto the substrate (col.4, ll. 42-61).

Claim 39. Williams teaches stops as least as high as the bumps (i.e., H1 = H2) (col. 4, last paragraph).

Claim 40. Assuming claim 39 depends from claim 25, Williams teaches conductive bumps that are shorter than the stops, but the stops are not twice as tall as the bumps (Fig. 9f). Additionally, without the foregoing assumption, H1=H2 satisfies claim 40 and claim 39.

Claim 41. In Williams, the bumps are "cold welded."

Claim 42. See treatment of claim 4.

Claim 43. Williams teaches stops surrounding each of the chips, but does not teach a lattice form (although that is not claimed in claim 43).

Claim 45. Williams teaches forming a seal around the periphery of the substrates using the stop material.

Claim 47. The indium bumps are softened to have adhesion.

Claim 48. The thermoplastic in Williams has a higher softening temperature than the indium bumps, which are soft at room temperature.

Claim 52. The thermoplastic adhesive used by Williams satisfies an adhesion and bonding property.

Claim 55. Both indium bumps and stops are formed on a substrate in Williams.

Claim 57. Both indium bumps and stops are formed on the readout chip in Williams, which corresponds to the pixel substrate in Tran.

Claim 58. In Williams the shorter bumps are formed before forming the stops (Figs. 9a-f).

Claims 59 and 62. The subject matter of Tran in view of Williams meets the limitations of claim 18 in a similar manner as it does claim 1. The electrode wires arranged in lattice form are present in the schematic depiction of the substrate in Fig. 2 of Tran. The method of bonding substrates to form the radiation detector is set forth in Example 3, col. 9.

Claims 11 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran and Williams as applied to claims 1, 3-4, 7-9, 13-15, 18, 20-21, 24-26, 36, 38-43, 45, 47-48, 52, 55, 57-58, 59, and 62 above, and further in view of U.S. Pat. No. 4,054,938 ("Morris").

Tran and Williams collectively teach a thermoplastic resin material as a stop layer as discussed above. Claims 11 and 50 differ from Tran and Williams by requiring an epoxy,

acrylic, or urethane as the space keeping member. Morris teaches that thermoplastics may be of an epoxy type (col. 4, ll. 45-52). It would have been obvious to one of ordinary skill in the art at the time of the invention to employ the epoxy type thermoplastic taught by Morris in the device of Tran in view of Williams to function as a thermoplastic material.

Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tran and Williams as applied to claims 1, 3-4, 7-9, 13-15, 18, 20-21, 24-26, 36, 38-43, 45, 47-48, 52, 55, 57-58, 59, and 62 above, and further in view of U.S. Pat. No. 4,865,245 ("Schulte").

Tran and Williams collectively teach conductive indium bumps which are used to join the substrates, but does not teach evacuating during bonding. Schulte teaches an indium bonding process whereby the indium bumps joined in an evacuated chamber so as to remove a protective layer from the bumps (col.3 ,ll. 21-44). It would have been obvious to one of ordinary skill in the art at the time of the invention to bond the substrates in the process of Tran in view of Williams under evacuated conditions to enable the use of a protective layer for the indium bumps as taught by Schulte.

Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran and Williams as applied to claims 1, 3-4, 7-9, 13-15, 18, 20-21, 24-26, 36, 38-43, 45, 47-48, 52, 55, 57-58, 59, and 62 above, and further in view of U.S. Pat. No. 5,812,191 ("Orava").

Tran and Williams collectively teach a radiation detector having a transistor readout circuit, but do not teach a storage capacitor in conjunction with the readout circuit. Orava teaches a readout circuit that uses a transistor in conjunction with a capacitor. (Orava, col. 4, ll. 28-29). Orava teaches using a capacitor to augment the charge accumulation function of a transistor. Orava, Tran, and Williams are within the field of radiation imagers. It would have been obvious to one of ordinary skill in the art at the time of the invention to include a capacitor

in the device taught by Tran and Williams to augment the charge accumulation function of the transistor as taught by Orava.

Allowable Subject Matter

Claims 2, 5-6, 10, 12, 19, 22-23, 27-35, 37, 46, 49, 51, 53-54, 56, 60-61, and 63-64 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 2 and 19 require space keeping members in lattice form. The space keeping members of Williams are not in lattice form.

Claims 5, 10, 22, 27, 34, 35, and 49 require a space keeping member formed of a photosensitive resin. Claims 6, 23, and 53-54 require a space keeping member formed of a photosensitive resin. Claims 12 and 51 require silicon dioxide space keeping members. Claim 37 requires an ink-jet printed space keeping member. The space keeping member of Williams is a thermoplastic resin. None of the references of record teach or suggest replacing the thermoplastic resin of Williams with one that is made of the materials or methods required by claims 5-6, 10, 12, 22-23, 27, 34-35, 37, 49, 51, and 53-54.

Claim 28-33 and 46 requires a connecting member that is made of a material (electrodeposited conductive resin, printed conductive adhesive, or photosensitive or thermosetting) other than an indium metal bump as taught by the above reference. None of the references of record teach or suggest replacing the indium bumps of Williams or Tran with a material required by claim 28-33 and 46.

Claims 61 and 64 require a connecting member that is higher than the space keeping member. Williams teaches the opposite--a stop layer (space keeping member) that is at least as high as the indium bumps (connecting member).

Claims 56, 60, 63 require the a bonding step using a bonding sheet, which has a photosensitive and a thermoplastic layer to form a space keeping member or a connecting member. The space keeping members of Williams are screen printed. None of the reference of record teach the bonding sheet required by claims 56, 60, or 63 employed to form a space keeping member or a connecting member.

Conclusion

Any inquiry concerning communications from the examiner should be directed to Jeff Vockrodt at (703) 306-9144 who can be reached on weekdays from 9:30 am to 5:00 pm EST. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian, can be reached at (703) 308-4905.

The fax numbers for this Group are (703) 305-3432, (703) 308-7722, (703) 305-3431, and (703) 308-7724. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist at (703) 308-0956.

September 22, 2003
J. Vockrodt

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